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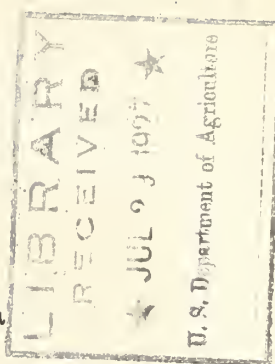
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UNITED STATES DEPARTMENT OF AGRICULTURE  
BUREAU OF BIOLOGICAL SURVEY

EFFECT OF RODENT POISONS ON GAME BIRDS

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There are many areas in Montana and in other western States where it would be quite impossible to raise crops if rodents, especially ground squirrels and prairie dogs, were not first destroyed. For this purpose large quantities of poisoned grain, chiefly whole oats poisoned with strychnine, are being used. Those concerned with dispensing this poison are frequently criticised by sportsmen and others who believe that its wide distribution is responsible for the scarcity of certain game birds.

Preparations containing arsenic, phosphorus, and other poisons are sometimes used, but, fortunately, practically all the rodent poisoned baits used in Montana are made with strychnine. Strychnine was selected by the Biological Survey years ago, not only because it was safe to use on areas inhabited by game birds, but because it was cheap, easy to use, and effective. It is a fortunate coincidence that this poison, which has proved so effective against rodent pests, can be consumed in large quantities by certain of our most important game birds without harm to them. In this article, unless otherwise stated, the poisoned grain referred to is whole oats treated with strychnine according to formulas recommended by the Bureau of Biological Survey of the United States Department of Agriculture for use in Montana against ground squirrels, prairie dogs, and other rodent pests.

Quail, Grouse, and Pheasants not Killed

It has been repeatedly requested that those who complain that poisoned grain is killing game birds show proof of such destruction, but efforts made to obtain evidence of this kind have always resulted in failure. Most of the complaints are due to imagination or hearsay, the assumption being that inasmuch as the strychnine-poisoned grain will kill rodents, the spreading of so much of it must necessarily mean the destruction of game birds also.

For several seasons crews of men have been using the poison against prairie dogs on the Crow and Tongue River Indian Reservations, the Custer National Forest, and other large areas in southeastern Montana. Tons of poisoned oats were used, and thousands of acres covered. The men have instructions to be continually on the lookout for evidences of the destruction of grouse. To date not a single incident has been reported of finding dead grouse, yet it is known that the areas covered are noted for being good grouse country. In Pondera County a few years ago it was reported that poisoned grain distributed through the county agent's office was killing off game birds. Believing that this was not true, the county agent posted in his local paper a standing reward of \$10 each for game birds thus killed. Although the affair attracted considerable attention, no claims for the reward have ever been presented. Strychnine kills swiftly if at all, and any susceptible bird eating the poison would not get far from the spot where it found the grain.

## Experiments With Captive Game Birds

At various times representatives of the Biological Survey have conducted experiments in feeding poisoned grain to certain game birds. Canada carried on tests of a similar nature, one of which consisted of feeding captive prairie chickens strychnine poisoned grain. The prairie chickens ate sufficient poison to kill several ground squirrels, yet they did not show the slightest ill effect. Some of the same poison fed to ground squirrels killed the rodents within a few minutes.

In California, captured quail were fed poisoned barley prepared for ground squirrels in the proportion of 1 ounce of strychnine to 16 quarts of grain. One adult quail ate 125 kernels in 24 hours with no sign of ill effect. This quantity of poisoned grain would have killed ten or twelve ground squirrels, each three or more times heavier than the bird. Another bird in three days ate 200 kernels of poisoned wheat that contained one half grain of strychnine. Although the strychnine taken was sufficient to kill twenty ground squirrels, the quail showed absolutely no ill effect from the poison.

In the State of Washington tests were made of feeding poisoned grain to Chinese pheasants. The bait was prepared with strychnine in the proportion of 1 ounce of strychnine to 12 quarts of grain. One of the birds ate 40 poisoned oats the first day and 60 the next morning but refused to eat any more the third day. Another ate 100 of the poisoned oats in one day. Neither bird showed any ill effect from eating the poison. A third pheasant was given no food for 24 hours, after which it ate 100 poisoned oats quickly. Another ate 150 poisoned oats readily. The men conducting the tests reported that none of the pheasants appeared to suffer in the least from the effect of the strychnine.

### The Montana Experiment

In January, 1923, three sharp-tailed grouse were obtained for feeding tests at Bozeman. One of the grouse was used as a check bird, while the other two were given grain poisoned with strychnine.

On January 10 all food was removed in the morning. At 2 p.m. each bird was given 6 kernels of corn and 50 kernels each of wheat and oats in order to learn their food preference, if any. The corn and wheat were eaten at once. The oats were not relished so much. By 4 p.m., however, two of the grouse had eaten all the oats. This grain was not poisoned. The birds were not fed again until the next day at 4 p.m.

On January 11 at 4 p.m. the check bird was given 300 clean oats. Bird No. 2 was fed 150 kernels of whole oats poisoned with strychnine as for Richardson ground squirrels. All this it ate at once readily. Another 150 kernels were given, which were mostly eaten by 4:10 p.m. A third feeding of 150 oats was then placed in the pen. By 4:30 p.m. all 450 kernels of poisoned grain had been consumed. In half an hour this bird ate sufficient poisoned grain to kill 40 to 50 ground squirrels and apparently was unaffected by the poison.



The other bird was given 300 kernels of oats poisoned for use against prairie dogs. Half of this was eaten at once, and by 4:30 p.m. 235 kernels had been eaten. If there were any harmful effects, they were not apparent.

The next two days the check bird was fed additional clean oats. It did not, however, seem to care much for them. The other two birds were supplied with nothing but poisoned oats of the kind mentioned above. They continued to eat it, but not so readily as on January 11, when such large quantities were consumed.

On January 14 all three grouse were active and hungry, although oats were still to be had. At 8:30 in the morning all oats were removed and each bird was given three tablespoonfuls (2,750 kernels) of clean wheat, which was eaten greedily. One bird ate about one third of this at once, and by 11:00 a.m. the following day it had eaten the entire quantity. The grouse by now had become quite tame and would take grain from the hand.

#### Additional Tests

Observations indicated that the three grouse did not especially relish oats and much preferred wheat; hence, in order to encourage them to consume more strychnine, wheat poisoned as for prairie dogs was offered them. One bird ate three fourths of a tablespoonful (more than 400 kernels) of this wheat. All of this was eaten at one time, and apparently satisfied the bird's appetite. It rested contentedly. The check bird continued to eat large quantities of clean wheat. One day between 9:00 a.m. and 4:30 p.m. it ate 2,200 kernels of wheat, always showing a preference for wheat over oats. The other two birds were now refusing to eat any more of the ~~poisoned wheat~~, indicating a dislike for it, although ~~what they had eaten~~ did not seem to affect them.

On January 18 the check bird, which until now had been given only clean grain, was offered a tablespoonful of the poisoned wheat. About half of this was eaten at once, then for some reason or other the remainder proved unattractive. The poisoned wheat was then removed and a tablespoonful of clean wheat substituted. All of this clean wheat was eaten at once. Although the bird had taken sufficient poisoned grain to kill several prairie dogs, its effect, if any, was insignificant, as indicated by the appetite of the bird when the clean wheat was supplied.

The poisoned wheat that the other two birds were now refusing to eat was removed. A tablespoonful of clean wheat was placed in one of the pens. The bird soon detected the difference and at once ate the entire quantity. During the day it ate almost four tablespoonfuls of clean wheat. The other bird showed the same discrimination, eating a large quantity of the clean wheat after refusing to take any more of the poisoned kind that had been kept before it continually for several days.

From the information herein submitted, it appears that certain game birds can consume large quantities of strychnine without any apparent harm, and that poisoned oats, such as recommended and used by the Biological Survey and its many cooperators in rodent-control work, are not responsible for a scarcity of game birds.



### Exact Reason for Immunity Not Known

The group of game birds that shows such a marked immunity from strychnine poisoning belongs to the gallinaceous order. In this group are prairie chickens, quail, Hungarian partridge, and Chinese pheasant, the several species of grouse, and domestic chickens.

Although it is known that gallinaceous birds have certain characteristics that make them highly resistant to the action of strychnine taken through the stomach, the exact reason for this is not thoroughly known. In gallinaceous birds, the crop, a dilation of the esophagus, is unusually large. The physiological processes of birds are exceedingly rapid and it is possible that in gallinaceous birds the absorption of strychnine through the walls of the digestive tract may be slow and the elimination by the excretory organs unusually rapid. Little or none of the strychnine enters the circulatory system, and convulsive spasms are not produced.

### Arsenic and Phosphorus

Rodent poisons are not all necessarily made with strychnine. Phosphorus, arsenic, and some other materials are sometimes used, but fortunately to a very limited extent in Montana. Game birds are not immune from these poisons and their use against rodent pests is not recommended. In a California experiment four quail were killed by feeding them grain poisoned with phosphorus. They showed a marked dislike for the poison, but by withholding other food, hunger eventually forced them to eat it. Tests with arsenic and thallium were conducted in a similar manner, and both proved fatal to quail.

### Not All Birds Are Immune

Not all species of birds are resistant to strychnine. In fact, strychnine baits are recommended for use against magpies, crows, sparrows, and other harmful birds. Domestic geese and ducks also are sometimes accidentally poisoned.

Farmers and others desire to protect useful birds, and it is regretted that in scattering poisoned oats in the field some of them may be killed especially if other small or broken grains are present. The number thus killed, however, is small. Thousands of rodents are killed to each bird accidentally poisoned. The benefits to farmers through the destruction of the various field rodents far out-weighs the danger to bird life. In Montana horned larks are poisoned more often than other species, because they are a ground-living bird and frequent areas where ground squirrels and prairie dogs are numerous. Fortunately, however, horned larks are very plentiful in this State, and the number killed by eating poisoned grain is small in proportion to the good work accomplished and the effect on their number is negligible. There is no question that the forces of nature, such as heavy rains and hailstorms, annually kill many more birds than poisoned grain does.

Ground squirrels themselves are destructive to certain birds. At the Experiment Station at Bozeman, they were caught carrying off newly hatched chickens. Other instances of ground squirrels raiding poultry yards have been reported. There is no question that they destroy the nests and young of ground-nesting birds, such as horned larks. Careful investigations would probably show that the destruction of a few birds by rodent poisons is more than compensated for by the destruction of some of the birds' worst enemies.

An examination of dead birds on areas treated with poisoned grain showed that practically all of them had been killed by eating wheat, hulled oats, broken kernels, or small weed seeds. The danger of accidental poisoning of useful birds is minimized by using for bait only plump whole oats as free as possible from materials small enough for the birds to pick up.

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